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ABSTRACT

This brochure lists science objectives developed by the Texas Education Agency considered basic or essential for mid-point level (grade 5 or 6) and for high school exit level. Objectives are grouped under three major headings: (1) science processes; (2) laboratory manipulative skills; and (3) use of science and technology (content). Suggestions for assessing the objectives are briefly stated. (Author/JN)

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TEXAS EDUCATION AGENCY
Division of Curriculum Development
201 East 11th Street
Austin, TX 78701

U.S. DEPARTMENT OF HEALTH,
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ESSENTIAL SCIENCE OBJECTIVES

SE 034 688

ESSENTIAL SCIENCE OBJECTIVES

Mid-Point Level

SCIENCE PROCESSES

AT A LEVEL APPROPRIATE TO THE AGE-LEVEL EXPECTATION, THE LEARNER CAN:

1. List similarities and differences in the characteristics of objects and/or events
2. Measure (quantify) characteristics of objects and/or events
3. Classify objects and/or events into groups using the likenesses or differences in characteristics
4. Describe space-time relationships between objects and/or events
5. Communicate the findings of investigations
6. Use graphs and charts to communicate information

LABORATORY MANIPULATIVE SKILLS

AT A LEVEL APPROPRIATE TO THE AGE-LEVEL EXPECTATION, THE LEARNER CAN:

1. Select and use appropriate instruments for use in making investigations
2. Measure lengths and volumes of common objects in metric units
3. Measure the temperature of liquids using the Celsius scale
4. Measure the masses in grams of different objects
5. Record observations using data tables, bar graphs, line graphs, histograms, and/or circle graphs

USE OF SCIENCE AND TECHNOLOGY (CONTENT)

AT A LEVEL APPROPRIATE TO THE AGE-LEVEL EXPECTATION, THE LEARNER CAN:

1. Construct operational definitions for basic machines: lever, wheel and axle, pulley, incline plane wedge, and screw
2. identify compound machines observed in everyday life
3. List at least five different forms of energy
4. Identify the three common states of matter
5. Describe the effects of heat on matter
6. Identify selected parts of the muscular, excretory, nervous, and endocrine systems from a drawing or model of the human
7. Describe the principal functions of the circulatory and respiratory systems
8. List the life processes of living things
9. Name the basic materials that cells need to maintain life
10. Name the parts of animal and plant cells that are (1) common to each, (2) possessed only by the plant cell, and (3) possessed only by the animal cell, from drawings or models
11. Name the main parts of a flower and state the function of each
12. Name sequential stages in the life cycle of the following: frog, fish, chicken, human
13. Explain the food pyramid
14. Identify air masses from a weather map
15. Read basic weather instruments such as a rain gauge, barometer, anemometer, and thermometer
16. Discuss the meaning of selected weather symbols

High School Completion (Exit Level)

SCIENCE PROCESSES

AT A LEVEL APPROPRIATE TO THE AGE-LEVEL EXPECTATION, THE LEARNER CAN:

1. Interpret data to find a pattern or trend
2. Infer the inherent meanings of observations
3. Predict future observations on the basis of relationships or trends of previous information
4. Identify the variables that may influence a situation or event
5. Operationally define terms according to their appearances or actions

LABORATORY MANIPULATIVE SKILLS

AT A LEVEL APPROPRIATE TO THE AGE-LEVEL EXPECTATION, THE LEARNER CAN:

1. Discuss general laboratory rules and safety procedures and demonstrate this knowledge in the laboratory
2. Demonstrate the proper techniques of using a microscope
3. Illustrate how a vernier scale may be used to obtain more precision in a linear measurement
4. Describe the correct method of reading an electrical meter
5. Demonstrate how pulley systems of a given theoretical mechanical advantage can be assembled
6. Explain and demonstrate the correct use of the laboratory burner
7. Discuss the safe method of heating a solution in a test tube
8. Construct a simple series and a parallel electrical circuit
9. Describe the accepted first aid and follow-up procedures to be used in case of (1) a chemical on the skin, (2) a chemical in the eye, (3) a burn, (4) a cut, (5) a puncture wound, (6) electrical shock

USE OF SCIENCE AND TECHNOLOGY (CONTENT)

AT A LEVEL APPROPRIATE TO THE AGE-LEVEL EXPECTATION, THE LEARNER CAN:

1. Trace the flow of energy through a given example of a food chain
2. Describe the functional relationships between parts of a cycle such as the oxygen-carbon dioxide cycle and the nitrogen cycle
3. List factors that function as controls on the size of populations
4. List the major systems of an organism and give their functions
5. Explain the function of each of the major organs in the human digestive system
6. Discuss the water cycle
7. Discuss the advantages of land-use planning
8. Describe the effects that people have on the water supply
9. Explain the processes: weathering, erosion, and deposition
10. Describe the structure of the atmosphere
11. Show the causes of the seasons of the year
12. Identify how water-cycle processes of evaporation, condensation, sublimation, and melting are dependent upon energy
13. List the principal uses of artificial satellites
14. Show how simple machines can (1) multiply a force or (2) change direction of a force
15. List the major sources of energy used today
16. Classify common substances as elements, compounds, or mixtures
17. Explain the difference between the meanings of the terms: heat and temperature
18. Read a thermometer to the nearest degree Celsius
19. Describe the effects of adding heat to a substance
20. Differentiate between static and current electricity
21. Distinguish between conduction and insulation

ESSENTIAL SCIENCE OBJECTIVES

DEVELOPING BASIC SCIENCE OBJECTIVES

In 1978, the science staff of the Texas Education Agency developed objectives considered basic or essential for mid-point level (Grade 5 or 6) and for high school exit level. The science objectives for the National Assessment of Educational Progress and for other national assessments were used as resources and/or as points of departure. The assessments were based on (1) content, the body of knowledge in science; (2) the process by which that body of knowledge comes about; and (3) science and society—the implications of that body of knowledge.

With the assistance of selected science supervisors and teachers, a first draft of mid-point and exit-point minimum objectives was developed and distributed to teachers, supervisors, and administrators for their review. Using input from the statewide reviewers, second and third drafts of the minimum objectives were written.

In their final form, the objectives are grouped under three major headings: (1) Science Processes, (2) Laboratory Manipulative Skills, and (3) Use of Science and Technology (content). The lists of essential objectives under these three headings may be used to assess students' achievement by local districts or in future statewide assessments. The objectives listed under Science Processes gauge students' thinking skills in solving problems. These skills may be evaluated by requiring the students to do specific tasks that indicate their minimal learning of new behaviors.

The evaluation of the development of Manipulative Skills may be determined by requiring the students to list and perform specific tasks for determining certain characteristics of living organisms and inanimate objects.

The objectives listed under Use of Science and Technology (content) may be assessed through such measures as multiple-choice test items.

The objectives may also be used to develop instructional materials, strengthen professional teacher competencies through pre-service and in-service, and evaluate instructional programs.

The objectives listed are merely minimum competencies to be achieved, and it is desired that students will go well beyond them to learn additional processes, skills, and content in science.